

<http://www.latimes.com/news/nationworld/nation/la-sci-pulsars3jul03,1,1973333.story?coll=la-headlines-nation>

THE NATION

Scientists See 'Cosmic Brake' Slowing Speed of Pulsars

advertisement

By Allison M. Heinrichs
 Times Staff Writer

July 3, 2003

Gravitational radiation — the ripples in the fabric of space-time predicted in Einstein's General Theory of Relativity — may be what saves the universe's fastest-rotating stars from spinning to death.

Scientists said Wednesday at a NASA news conference that pulsars — rapidly spinning stars that emit pulses of electromagnetic radiation like rotating lighthouse beacons — have a speed limit of about 760 rotations per second. If such a speed limit did not exist, the stars would fly apart, said MIT professor Deepto Chakrabarty, lead author of the report published today in the journal *Nature*.

Something must be imposing the speed limit, and UC Santa Barbara theoretician Lars Bildsten has proposed that gravitational radiation may be responsible by acting as a kind of cosmic brake.

Unlike light, which is distorted by matter as it travels through outer space, gravitational waves are thought to be unchanged by the materials they pass through.

Caltech physicist Gary Sanders explains this idea with the following analogy. Picture a bowling ball sitting in the middle of a trampoline. It warps the trampoline the same way matter distorts the fabric of space-time. If a tennis ball were placed on the trampoline, it would roll toward the bowling ball — an attraction that represents gravity, the invisible force that draws objects toward each other.

Now imagine dropping another bowling ball on one side of the trampoline — its springy surface will be distorted by waves. When these waves reach the first two balls, they will move, but the wave itself will pass right through them and continue on, undisturbed, to the other end of the trampoline.

These waves represent gravitational radiation.

let
 opportunity
 find you.

have
 job matches
 emailed
 directly to
 your inbox.

email job leads

careerbuilder.com

The smarter way
 to find a better job.

The existence of gravitational waves is unproved, but the discovery of the pulsar speed limit helps support the idea.

Born from a massive stellar explosion, pulsars are about the size of a small city but have a mass equal to that of the sun. These stellar remains start out rotating 30 times a second but eventually slow down like a toy top, at which point they become known as neutron stars.

However, if a neighboring star is feeding the pulsar, its rotation will speed up to thousands of times a second, Bildsten said. If there were nothing to slow down this rotation, the star would just keep spinning up to furiously fast speeds until it broke apart.

It is believed that pulsars emit gravitational radiation, which acts to counterbalance the influx of material from the pulsars' companion stars, slowing the stars before they can spin to their deaths.

Chakrabarty and his team discovered the pulsar speed limit using NASA's Rossi X-Ray Timing Explorer, a satellite specially designed to look at the extremely fast variations of the universe's brightest X-ray sources.

The detection of gravitational waves would open a new world to astronomers. Scientists believe that undisturbed gravitational waves produced during the Big Bang could give them a new view of the early universe.

If they exist, the Laser Interferometer Gravitational-Wave Observatory, two facilities separated by a distance of 2,000 miles but operated in unison, may be able to detect these waves, said Barry Barish, a Caltech physicist and lead scientist for LIGO.

When LIGO becomes fully operational in 2004, scientists will be able to begin the search for gravitational wave sources.

If you want other stories on this topic, search the Archives at latimes.com/archives.



[Click here for article licensing and reprint options](#)

Copyright 2003 Los Angeles Times